

ENGINE STARTER FOR REMOTE-CONTROL TOY CAR

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates an engine starter for remote-control toy car and, more particularly, to such an engine starter that can be used to substitute for the traction rope type engine starter of a conventional remote-control toy car. .

2. Description of the Related Art

 A conventional remote-control toy car uses a traction rope type engine starter
10 to start the engine (see FIG. 12). It is difficult to start the engine with the traction rope. When operating the traction rope type engine starter, the traction rope may break easily, or the user's hand tends to be injured by the traction rope. Further, before starting the engine, the user must open the engine hood so that the user can start the concealed engine. When started, the user must close the engine hood again to keep the engine
15 from sight.

 In order to eliminate the aforesaid drawbacks, electric engine starters are developed. A conventional electric engine starter is known comprising a platform carrying a motor, a switch, a transmission gear, and a power cord. During operation, the user must couple the crank of the engine to the transmission gear and connect the
20 power cord to an external battery pack (for example, the battery power supply of a motor vehicle), and then switch on the switch to start the motor, causing the motor to turn the transmission gear and then the engine of the remote-control toy car. This design of electric engine starter is still not satisfactory in function because of the disadvantages of heavy weight and limited to the availability of external battery power
25 supply.

US91203678 discloses an electric auxiliary engine starter, which was invented by the present inventor. This design of electric auxiliary engine starter is functional. According to this design, the electric auxiliary engine starter uses a starter rod for coupling to a back center hole of the engine of a remote-control toy car to start the engine. However, this design of electric auxiliary engine starter is not suitable for all designs of remote-control toy cars. The oil tank or other parts of the engine of other designs of remote-control toy car may hinder the insertion of the starter rod into the back center hole of the engine.

SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide an engine starter, which is practical for use to substitute for the traction rope type engine starter of a remote-control toy car. It is another object of the present invention to provide an engine starter that can easily be installed in the engine of a remote-control toy car after removal of the traction rope type engine starter of the remote-control toy car. It is still another object of the present invention to provide an engine starter, which can be selectively installed in the engine of a remote-control toy car in one of multiple mounting positions subject to the user's convenience.

To achieve these and other objects of the present invention, the engine starter comprises a casing; a cushion mounted inside the casing, the cushion having an axially extended center through hole; a driven bevel gear mounted inside the casing, the driven bevel gear having a polygonal center through hole axially aligned with the axially extended center through hole of the cushion; a driving bevel gear mounted in the casing, the driving bevel gear having a polygonal coupling hole disposed at one side thereof outside the casing and a coupling rod axially disposed at an opposite side

thereof opposite to the polygonal coupling hole; a locating block mounted on the coupling rod of the driving bevel gear inside the casing; a locating cap fixedly fastened to the casing to hold the driving bevel gear inside the casing for enabling the driving bevel gear to be rotated relative to the locating cap; and a cover plate covered on the casing to hold the cushion, the driven bevel gear, the driving bevel gear, the locating block and the locating cap in place.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a front plain view of an engine starter according to the present invention.

10 FIG. 1B is a sectional view taken along line B-B of FIG. 1A.

FIG. 2 is a sectional plain view of the cover plate of the engine starter according to the present invention.

FIG. 3A is a side view in section of the driven bevel gear for the engine starter according to the present invention.

15 FIG. 3B is a front plain view of the driven bevel gear for the engine starter according to the present invention.

FIG. 4A is a side view in section of the cushion for the engine starter according to the present invention.

20 FIG. 4B is a front plain view of the cushion for the engine starter according to the present invention.

FIG. 5A is a plain view in section of the driving bevel gear for the engine starter according to the present invention.

FIG. 5B is an end plain view of the driving bevel gear for the engine starter according to the present invention.

25 FIG. 6A is a top plain view of the locating block for the engine starter

according to the present invention.

FIG. 6B is a side plain view of the locating block for the engine starter according to the present invention.

FIG. 7 is a plain view of the locating cap for the engine starter according to
5 the present invention.

FIG. 8 is an exploded view in section of the engine starter according to the present invention.

FIG. 9 is an elevational exploded view of the engine starter according to the present invention.

10 FIG. 10A is a sectional plain view taken along line B-B of FIG.10B.

FIG. 10B is a side plain view in section of the present invention, showing the engine starter installed in the engine and the polygonal coupling hole of the driving bevel gear facing downwards.

FIG. 11 is a schematic drawing showing an application example of the
15 present invention before insertion of the starter rod of the electric auxiliary starter into the polygonal coupling hole of the driving bevel gear.

FIG. 12 is a plain view of a traction rope type engine starter according to the prior art.

FIG. 13 is a schematic drawing showing the engine starter of the present
20 invention installed in the engine of a conventional toy car after removal of the traction rope type engine starter from the engine with the polygonal coupling hole of the driving bevel gear disposed at one lateral side.

FIG. 14 is similar to FIG. 13 but showing the direction of the engine starter reversed.

25 FIG. 15 is a schematic drawing of a traction rope type engine for a remote-

control toy car according to the prior art.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. 8 and 9, an engine starter **100** in accordance with the present invention is shown comprising a casing **10**, a driving bevel gear **34**, a driven
5 bevel gear **24**, a cushion **32**, a locating block **40**, a locating cap **50**, and a cover plate **18**.

Referring to FIGS. 1A and 1B, the casing **10** has a receiving open chamber **12**, two sliding grooves **14** axially symmetrically disposed at two sides in the receiving open chamber **12**, and a multi-angle hole **16** at the bottom side.

10 Referring to FIG. 2, the cover plate **18** has two sliding rails **20** symmetrically disposed at two sides corresponding to the sliding grooves **14**, a multi-angle hole **22** disposed at the bottom side and complementary to the multi-angle hole **16** of the casing **10** for forming with the multi-angle hole **16** a polygonal hole.

Referring to FIGS. 3A and 3B, the driven bevel gear **24** has a polygonal
15 center through hole **26**.

Referring to FIGS. 4A and 4B, the cushion **32** is an annular member having an axially extended center through hole.

Referring to FIGS. 5A and 5B, the driving bevel gear **34** has a polygonal coupling hole **36** disposed at one side, and a coupling rod **38** axially disposed at the
20 other side.

Referring to FIGS. 6A and 6B, the locating block **40** is a rectangular block having a semicircular notch **42** at one side.

Referring to FIG. 7, the locating cap **50** is a polygonal cap fitting the polygonal hole formed of the aforesaid multi-angle holes **22** and **16**, having an axially
25 extended center through hole adapted to accommodate the driving bevel gear **34**.

The assembly process of the engine starter **100** is outlined hereinafter with reference to FIG. 8. The cushion **32** is fitted into the receiving open chamber **12** inside the casing **10**, and then the semicircular notch **42** of the locating block **40** is attached to the coupling rod **38** of the driving bevel gear **34**, and then the locating block **40** with the driving bevel gear **34** are inserted into the receiving open chamber **12** inside the casing **10** for enabling the gear shaft of the driving bevel gear **34** to extend out of the multi-angle hole **16** of the casing **10**, and then the driven bevel gear **24** is put in the receiving open chamber **12** inside the casing **10** and set into engagement with the driving bevel gear **34**, and then the sliding rails **20** of the cover plate **18** are respectively inserted into the sliding grooves **14**, and then screws are used to fixedly secure the cover plate **18** to the casing **10** so as to hold the driving bevel gear **34**, the driven bevel gear **24**, the locating block **40** and the cushion **32** inside the receiving open chamber **12**, and then the locating cap **50** is fitted into the polygonal hole of the aforesaid multi-angle holes **22** and **16**, for enabling the gear shaft of the driving bevel gear **34** to extend out of the axially extended center through hole of the locating cap **50**.

When assembled, the engine starter can be installed in the engine of a remote-control toy car to replace the conventional traction rope type engine starter. After removal of the traction rope type engine starter, the polygonal center through hole **26** of the driven bevel gear **24** is coupled to the polygonal output shaft **52** of the engine of the remote-control toy car, and then the casing **10** is fixedly fastened to the housing of the engine of the remote-control toy car (see FIGS. 10A and 10B). When installed, the polygonal coupling hole **36** of the driving bevel gear **34** faces vertically downwards for receiving the starter rod **48** of an electric auxiliary starter **56** (see FIG. 11).

Referring to FIGS. 13 and 14, the engine starter **100** can be so arranged that the driving bevel gear **34** is disposed at one lateral side such that the driving bevel gear **34** can be started by the starter rod **48** of the electric auxiliary starter **56** from one lateral side. Either the aforesaid bottom or lateral side loading, the operation of the
5 engine starter **100** is free from the interference of the other parts of the toy car.

Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.